

Appl. No. 10/765,531

Attorney Docket No.: N1085-00225 (TSMC2003-0656)

Amdt. dated 06/25/2007

N1280-00235

Response to Office Action of 03/23/2007

REMARKS/ARGUMENTS

Claims 1-25 are pending in this application, with claims 1-8 having been previously withdrawn from consideration. Examined claims 9-25 have each been rejected. Applicants hereby amend claims 9-11, 16, and 21-23. Applicants respectfully request re-examination, reconsideration and allowance of each of pending claims 9-25.

On page 2 of the subject Office action, claims 9-25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Libby, et al. (USPN 7,094,312), hereinafter "Libby," in view of Nakasuji, et al. (2002/0028399), herein after "Nakasuji." Applicants respectfully submit that each of these claim rejections is overcome for reasons set forth below.

Each of amended independent claims 9, 16 and 21 clearly recites the feature/step of mask writing.

In particular, independent claim 9 recites "wherein the means for processing the feature comprise means for writing a mask pattern." Independent claim 16 recites "wherein the processing comprises writing a mask pattern." Independent claim 21 recites the feature that "wherein the mask processing module is a mask writing tool." and "a mask processing module utilizing the predetermined reference system for creating the feature on the mask or reticle substrate."

The primary reference of Libby is not directed to forming or otherwise processing a mask. Libby is directed to performing processes on semiconductor substrates. In fact, the term "mask" does not appear in Libby. Writing a mask feature is clearly distinguished from processing a semiconductor substrate. This shortcoming of Libby is somewhat noted on page 4 of the subject Office action, first two lines, which reads "The teachings of Libby et al. differ from those of the Applicant in that the Applicant teaches that the system has means for inspecting the mask for defects." The Office action continues, in the subsequent paragraph, to rely upon Nakasuji for teaching an inspection apparatus. The Office action concludes, on lines 12-15 of page 4, that "It

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would have been obvious to one having ordinary skill in the art to take the teachings of Libby et al. and combine them with the teachings of Nakasuji et al. in order to make the claimed invention because it is well-known in the art to inspect masks for defect and repair them."

5 Applicants point out that neither Libby nor Nakasuji, however, teaches writing a mask pattern. Applicants rely on the originally-filed specification, which supports that "writing" is known to one of ordinary skill in the art to mean creating a pattern on a mask, as well as the reference <http://www.pkl.co.kr/english/product/product05.html> as viewed on 13 June 2007, which teaches the same. As above, Libby is not directed to
10 masks at all, and Nakasuji is an inspection apparatus. Nakasuji does not teach writing a mask pattern.

Each of independent claims 9, 16 and 21 also recites that the processed feature which is formed along a horizontal or vertical reference direction of the predetermined reference system, is also formed at an offset or oblique angle with respect to the side
15 (or edge - claim 9) of the mask or reticle substrate. Neither Libby nor Nakasuji teaches a feature formed angled with respect to an edge of the workpiece being processed. While the angled particle beam of Libby may form a feature angled with respect to the surface of the workpiece, Applicants respectfully submit that Libby does not teach forming a feature that is angled with respect to an edge/side of the workpiece. As such,
20 independent claims 9, 16 and 21 are further distinguished from Libby and Nakasuji.

Independent claims 9, 16 and 21 are therefore distinguished from Libby in view of Nakasuji. Claims 10-15, 17-20 and 22-25 are similarly distinguished from the Libby and Nakasuji references by virtue of their respective dependencies. As such, the rejection of claims 9-25 under 35 U.S.C. § 103, should be withdrawn.

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CONCLUSION

Based on the foregoing, each of pending claims 9-25 is in allowable form and the application in condition for allowance, which action is respectfully and expeditiously requested.

The Assistant Commissioner for Patents is hereby authorized to charge any fees necessary to give effect to this filing and credit any excess payment that may be associated with this communication to Deposit Account 04-1679.

Respectfully submitted,

Dated: June 25, 2007



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Attachment: <http://www.pkl.co.kr/english/product/product05.html> as viewed on 13 June 2007.

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Mask Process

Product > Mask Process > Process flow

- ① Process flow
- ② e beam Exposure
- ③ Develop process
- ④ Etching
- ⑤ Cleaning
- ⑥ CD Regi
- ⑦ Defect Inspection
- ⑧ Pellicle

Process flow

Global
Network

e-Technology

Contract

Part



- 1 | On Quartz substrate, Cr/CrO₂ layer is formed by sputtering, followed by PR coating on top of it.



- 2 | Using E-Beam or Laser lithography equipment, a certain pattern is written on the surface of the PR layer.



- 3 | Using developer (chemicals), the pattern formation is finalized over the PR area which was exposed by the lithography equipment.



- 4 | Using either dry or wet etching technique, the exposed Cr/CrO₂ layer is etched to reveal the Quartz surface. The area covered by PR is unaffected.

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- 5 | Remaining PR is removed via strip process, followed by clean and dry steps. At this stage, the photomask surface is composed of dark or clear area (dark area is still covered by Cr/CrO₂ whereas clear area is naked Quartz, which transmits incoming light source.



- 6 | CD measurement is performed over the Dark or Clear space patterns.

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- 7 | Positional accuracy of key patterns are measured.



- 8 | Defects are identified and necessary repair work is performed in order to ensure confirmation to the design.

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- 9 | Particles are removed during cleaning step.



- 10 | Pellicle is mounted over the finished side of Quartz plate in order to prevent potential contamination.

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